Amendments to the Claims

1.-51. (canceled)

52. (new) An illumination-optical system, comprising:

a light source that emits extreme ultraviolet (EUV) light;

a collimator located downstream of the light source;

a fly's-eye mirror located downstream of the collimator and comprising multiple unit mirrors; and

a condenser located downstream of the fly's eye mirror and having an emission side;

wherein the illumination-optical system Köhler-illuminates a prescribed illumination area on the emission side of the condenser, the illumination area including one or more illumination irregularities; and

at least one of the unit mirrors of the fly's-eye mirror is a correction mirror having reflectivity irregularities configured to correct at least a portion of the one or more illumination irregularities in the illumination area.

53. (new) The illumination-optical system of claim 52, wherein:

the fly's eye mirror comprises a number of correction mirrors, the number being one or more; and

a ratio of the number of correction mirrors to the number of unit mirrors of the fly's eye mirror has a value that is according to an extent of the illumination irregularities.

54. (new) The illumination-optical system of claim 52, wherein:

each unit mirror and each correction mirror comprises a respective reflecting surface coated with a respective multilayer film to improve reflectivity of the reflecting surface to the EUV light; and

the multilayer film on each correction mirror has a respective distribution of number of layers across the reflecting surface, the distribution corresponding to the respective reflectivity irregularity of the correction mirror.

55. (new) The illumination-optical system of claim 52, wherein:

the unit mirrors and the at least one correction mirror have respective orientations at which EUV light from the light source is incident at respective oblique angles of incidence;

the angles of incidence are within a range of total-reflection angles; and

each correction mirror has a surface structure including at least one feature configured to have a distribution sufficient to define the respective reflectivity irregularities.

56. (new) The illumination-optical system according to claim 55, wherein:

the EUV light emitted by the light source has a wavelength of 50 nm or less; and

the multiple unit mirrors comprise Ru or Mo and are placed at respective orientations providing an oblique angle of incidence of 15° or less to incident EUV light.

57. (new) The illumination-optical system of claim 52, wherein the correction mirror corrects illumination irregularities arising from polarized light that, among polarized light polarized in two intersecting directions that is illuminating the illumination area, is polarized in at least one of the directions.

58. (new) The illumination-optical system of claim 52, wherein:

the correction mirror has a first reflectivity-distribution characteristic and a second reflectivity-distribution characteristic;

the first reflectivity-distribution characteristic is for a first polarization component and is configured to correct illumination irregularities arising from the first polarization component illuminating the illumination area; and

the second reflectivity-distribution characteristic is for a second polarization component, polarized in a direction intersecting a respective direction of the first polarization component illuminating the illumination area, and is configured to correct illumination irregularities arising from the second polarization component illuminating the illumination area.

59. (new) An illumination-optical system, comprising:

a light source that emits extreme ultraviolet (EUV) light;

a collimator located downstream of the light source;

a fly's-eye mirror located downstream of the collimator and comprising multiple unit mirrors each having an incidence side; and

a condenser located downstream of the fly's-eye mirror and having an emission side;

wherein the illumination-optical system Köhler-illuminates a prescribed illumination area on the emission side of the condenser, the illumination area including one or more illumination irregularities; and

at least one of the unit mirrors of the fly's-eye mirror includes a respective correction filter situated on the incidence side of the unit mirror, the correction filter having transmissivity irregularities configured to correct at least a portion of the one or more illumination irregularities in the illumination area.

60. (new) The illumination-optical system of claim 59, wherein:

the fly's-eye mirror comprises a number of correction filters, the number being one or more; and

a ratio of the number of correction filters to the number of the unit mirrors of the fly's-eye mirror has a value that is according to an extent of the illumination irregularities.

61. (new) The illumination-optical system of claim 59, wherein the at least one correction filter has a respective thickness distribution sufficient to define the respective transmissivity irregularities.

62. (new) The illumination-optical system of claim 59, wherein:

the unit mirrors have respective orientations at which EUV light from the light source is incident at respective oblique angles of incidence; and

the angles of incidence are within a range of total-reflection angles.

63. (new) The illumination-optical system of claim 62, wherein:

the EUV light emitted by the light source has a wavelength of 50 nm or less; and

the multiple unit mirrors comprise Ru or Mo and are placed at respective orientations providing an oblique angle of incidence of 15° or less to incident EUV light.

64. (new) The illumination-optical system of claim 59, wherein the correction filter includes:

a first transmissivity distribution for a first polarization component, the first transmissivity distribution being configured to correct illumination irregularities due to the first polarization component illuminating the illumination area; and

a second transmissivity distribution for a second polarization component, polarized in a direction intersecting a respective direction of the first polarization component illuminating the illumination area, to correct illumination irregularities due to the second polarization component illuminating the illumination area

65. (new) The illumination-optical system of claim 64, wherein the correction filter includes:

a first filter member, having a first transmissivity distribution for a first polarization component, to correct illumination irregularities due to the first polarization component illuminating the illumination area; and

a second filter member, having a second transmissivity distribution for a second polarization component, polarized in a direction intersecting a respective direction of the first polarization component illuminating the illumination area, to correct illumination irregularities due to the second polarization component illuminating the illumination area.

66. (new) An illumination-optical system, comprising:

multiple optical members situated and configured to guide a prescribed light to an illumination area and to illuminate the illumination area; and

correction means for correcting illumination irregularities arising from a non-uniform optical-intensity distribution of polarized light in the illumination area.

67. (new) The illumination-optical system of claim 66, wherein said correction means corrects illumination irregularities arising from the polarized light being polarized in at least one direction, among polarized light polarized in two intersecting directions, and illuminating the illumination area.

68. (new) The illumination-optical system of claim 66, wherein said correction means has optical characteristics that are established so as to correct illumination irregularities of light of a first polarization component illuminating the illumination area, and to correct illumination irregularities of light of a second polarization component, polarized in a direction intersecting the direction of the first polarization component, illuminating the illumination area.

69. (new) The illumination-optical system of claim 68, wherein the optical characteristics of said correction means are established so as to correct the illumination irregularities and to correct a difference in intensity between the first polarization component and the second polarization component.

70. (new) The illumination-optical system of claim 68, wherein said correction means comprises:

a first correction member having optical characteristics that are established so as to correct the illumination irregularities of the first polarization component of light illuminating the illumination area; and

a second correction member having optical characteristics that are established so as to correct the illumination irregularities of the second polarization component of the light illuminating the illumination area.

71. (new) The illumination-optical system of claim 66, wherein said correction means is situated either at a position that is optically conjugate with the illumination area or at a position that is shifted by a prescribed amount from the optically conjugate position.

72. (new) The illumination-optical system of claim 66, wherein:

at least one of the optical members is a fly's-eye mirror comprising multiple unit mirrors; and

said correction means is provided on at least one of the unit mirrors.

73. (new) An illumination-optical system, comprising:

multiple reflecting members each having a reflecting surface coated with a multilayer film, the multilayer films being configured to enhance respective reflectivities of the reflecting surfaces to extreme ultraviolet (EUV) light having a wavelength of 50 nm or less, the reflecting members being arranged so as to direct the EUV light to illuminate a prescribed illumination area; and

correction means, placed at a position that is optically conjugate with the illumination area or at a position that is shifted a prescribed amount from the optically conjugate position, having optical characteristics serving to correct illumination irregularities in the illumination area.

74. (new) The illumination-optical system of claim 73, wherein at least one of the reflecting members is a fly's-eye mirror comprising multiple unit mirrors.

75. (new) An illumination-optical system, comprising:

multiple reflecting members arranged to direct extreme ultraviolet (EUV) light, having a wavelength 50 nm or less, so as to illuminate a prescribed illumination area with the EUV light; and

correction means, placed at a position that is optically conjugate with the illumination area or at a position shifted a prescribed amount from the optically conjugate position, having optical characteristics serving to correct illumination irregularities in the illumination area;

wherein at least one of the reflecting members is oriented such that EUV light incident to said reflecting member is incident at an oblique angle of incidence that is a total-reflection angle.

76. (new) The illumination-optical system of claim 75, wherein at least one of the reflecting members is a fly's-eye mirror comprising multiple unit mirrors.

77. (new) An illumination-optical system, comprising:

multiple reflecting members situated and configured to direct a prescribed light and to illuminate a prescribed illumination area with the prescribed light, at least one of the reflecting members exhibiting a reflectivity distribution; and

correction means having optical characteristics for correcting illumination irregularities in the illumination area, the optical characteristics being established based on data concerning the reflectivity distribution.

78. (new) The illumination-optical system of claim 77, wherein the optical characteristics of said correction means are established based upon measurement data concerning the illumination irregularities and on data concerning the reflectivity distribution.

79. (new) The illumination-optical system of claim 77, wherein:

at least one of the multiple reflecting members is a fly's-eye mirror comprising multiple unit mirrors;

the optical characteristics of said correction means are established based upon data concerning a reflectivity characteristic of at least one of the unit mirrors; and

said correction means is provided on at least one of the unit mirrors.

80. (new) The illumination-optical system of claim 77, wherein each reflecting member includes a respective reflecting surface coated with a multilayer film that enhances reflectivity of the reflecting surface.

81. (new) The illumination-optical system of claim 77, wherein at least one of the reflecting members is oriented such that the prescribed light is incident to the at least one reflecting member at an oblique angle of incidence that is a total-reflection angle.

82. (new) The illumination-optical system of claim 77, wherein said correction means is for correcting illumination irregularities arising due to a non-uniform distribution of optical intensity of polarized light in the illumination area.

83. (new) The illumination-optical system of claim 82, wherein the optical characteristics of said correction means are established so as to achieve:

correction of intensity irregularities of light of a first polarization component, having a first polarization direction, illuminating the illumination area; and

correction of intensity irregularities of light of a second polarization component, polarized in a direction intersecting the first polarization direction, illuminating the illumination area.

84. (new) The illumination-optical system of claim 83, wherein the optical characteristics of said correction means are further established so as to achieve correction of intensity difference between the first polarization component and the second polarization component.

85. (new) The illumination-optical system of claim 83, wherein said correction means comprises:

first correction means having optical characteristics for correcting illumination irregularities of the first polarization component of light illuminating the illumination area; and

second correction means, having optical characteristics for correcting illumination irregularities of the second polarization component of the light.

86. (new) A projection-exposure system, comprising:

a reticle stage configured to hold a reticle on a first surface;

a substrate stage configured to hold a photosensitive substrate on a second surface;

a projection-optical system situated and configured to project an image of the first surface onto the second surface; and

an illumination-optical system as recited in claim 52, the illumination-optical system being configured to illuminate the first and the second surfaces simultaneously by illuminating the first surface, and being configured in advance to correct illumination irregularities on the first surface or on the second surface serving as the illumination area.

87. (new) A microdevice-manufacturing method, comprising a lithographic step performed using the projection-exposure system recited in claim 86.

88. (new) A projection-exposure system, comprising:

a reticle stage configured to hold a reticle on a first surface;

a substrate stage configured to hold a photosensitive substrate on a second surface;

a projection-optical system situated and configured to project an image of the first surface onto the second surface; and

an illumination-optical system as recited in claim 59, the illumination-optical system being configured to illuminate the first and the second surfaces simultaneously by illuminating the first surface, and being configured in advance to correct illumination irregularities on the first surface or on the second surface serving as the illumination area.

89. (new) A microdevice-manufacturing method, comprising a lithographic step performed using the projection-exposure system recited in claim 88.

90. (new) A projection-exposure system, comprising:

a reticle stage configured to hold a reticle on a first surface;

a substrate stage configured to hold a photosensitive substrate on a second surface;

a projection-optical system situated and configured to project an image of the first surface onto the second surface; and

an illumination-optical system as recited in claim 73, the illumination-optical system being configured to illuminate the first and the second surfaces simultaneously by illuminating the first surface, and being configured in advance to correct illumination irregularities on the first surface or on the second surface serving as the illumination area.

91. (new) A microdevice-manufacturing method, comprising a lithographic step performed using the projection-exposure system recited in claim 90.

92. (new) A projection-exposure system, comprising:

a reticle stage configured to hold a reticle on a first surface;

a substrate stage configured to hold a photosensitive substrate on a second surface;

a projection-optical system situated and configured to project an image of the first surface onto the second surface; and

an illumination-optical system as recited in claim 75, the illumination-optical system being configured to illuminate the first and the second surfaces simultaneously by illuminating the first surface, and being configured in advance to correct illumination irregularities on the first surface or on the second surface serving as the illumination area.

93. (new) A microdevice-manufacturing method, comprising a lithographic step performed using the projection-exposure system recited in claim 92.

94. (new) A projection-exposure system, comprising:

a reticle stage configured to hold a reticle on a first surface;

a substrate stage configured to hold a photosensitive substrate on a second surface;

a projection-optical system situated and configured to project an image of the first surface onto the second surface; and

an illumination-optical system as recited in claim 77, the illumination-optical system being configured to illuminate the first and the second surfaces simultaneously by illuminating the first surface, and being configured in advance to correct illumination irregularities on the first surface or on the second surface serving as the illumination area.

95. (new) A microdevice-manufacturing method, comprising a lithographic step performed using the projection-exposure system recited in claim 94.

96. (new) A projection-exposure system, comprising:

an illumination system situated and configured to illuminate a reticle, defining a pattern, with a prescribed light; and

a projection system situated and configured to project an image of the pattern onto a photosensitive substrate;

wherein the illumination system comprises correction means for correcting illumination irregularities arising due to non-uniformity of an optical-intensity distribution of polarized light at a surface of the reticle or at a surface of the photosensitive substrate.

97. (new) The projection-exposure system of claim 96, wherein said correction means is for correcting illumination irregularities arising from polarized light polarized in at least one direction among polarized light polarized in two intersecting directions.

98. (new) The projection-exposure system of claim 97, wherein said correction means comprises:

a first correction member that corrects illumination irregularities due to light of a first polarization component, among the light of first and second polarization components polarized in two intersecting directions; and

a second correction member that corrects illumination irregularities due to light of the second polarization component, among the light of the first and second polarization components polarized in two intersecting directions.

99. (new) The projection-exposure system of claim 98, wherein said correction means comprises a third correction member that corrects a difference in optical intensity between the first polarization component and the second polarization component.

100. (new) A method for manufacturing an illumination system, the method comprising:

preparing an illumination-optical system that guides light to an illumination area; and

correcting illumination irregularities arising due to a non-uniform distribution of optical intensity of polarized light in the illumination area.

101. (new) The method of claim 100, wherein the correcting step comprises correcting irregularities arising due to polarized light polarized in at least one direction among polarized light polarized in two intersecting directions.

102. (new) The method of claim 100, wherein the correcting step comprises:

correcting irregularities due to light of a first polarization component, among light of first and second polarization components polarized in two intersecting directions; and

correcting irregularities due to light of the second polarization component, among the light of the first and second polarization components polarized in two intersecting directions.

103. (new) The method of claim 102, wherein the correcting step further comprises correcting a difference in optical intensity between light of the first polarization component and light of the second polarization component.

104. (new) The method of claim 100, wherein the preparing step further comprises preparing the illumination-optical system to direct light having a wavelength of 50 nm or less to the illumination area.

105. (new) A method for adjusting a projection-exposure system, comprising:

preparing a projection-exposure system, comprising an illumination system that illuminates a reticle defining a pattern and a projection system that projects an image of the pattern onto a photosensitive substrate; and

correcting irregularities arising from a non-uniform distribution of optical intensity at a surface of the reticle or at a surface of the photosensitive substrate.

106. (new) The method of claim 105, wherein the correcting step comprises correcting irregularities arising from polarized light polarized in at least one direction among polarized light polarized in two intersecting directions.

107. (new) The method of claim 105, wherein the correcting step comprises:

correcting irregularities due to light of a first polarization component, among light of first and second polarization components polarized in two intersecting directions; and

correcting irregularities due to light of the second polarization component, among light of the first and second polarization components polarized in two intersecting directions.

108. (new) The method of claim 107, wherein the correcting step further comprises correcting a difference in optical intensity between light of the first polarization component and light of the second polarization component.

109. (new) The method of claim 105, wherein the preparing step comprises configuring the illumination system to illuminate the reticle with light having a wavelength 50 nm or less.

110. (new) A method for manufacturing microdevices, comprising:

preparing a projection-exposure system, comprising an illumination system that illuminates a reticle defining a pattern and a projection system that projects an image of the pattern onto a photosensitive substrate;

adjusting the projection-exposure system by correcting irregularities arising from a non-uniform distribution of optical intensity at a surface of the reticle or at a surface of the photosensitive substrate;

using the illumination-optical system to illuminate the pattern on the reticle with a prescribed light; and

using the projection system to project an image of the illuminated pattern onto the photosensitive substrate.

111. (new) The method of claim 110, further comprising correcting irregularities arising from a non-uniform distribution of optical intensity at a surface of the reticle or at a surface of the photosensitive substrate.